Claims

We claim

1. A glucose and fructose biopolymer obtained from a Lactococcus lactis strain (NRRLB-30656) metabolism products, wherein said metabolism products comprise an enzymatic extract or preparation having two types of glucosyltransferase and fructosyltransferase activity and wherein said biopolymer has a composition having a 0.2 to 0.7 glucose/fructose ratio characterised by the following properties:

    - 900-1,100 Kilodalton molecular weight;
    - two vitreous transition points; the first between 20°C and 30°C and the second between 190°C and 220°C;
    - stability in aqueous solutions, pH values ranging from 2 to 9;
    - 1,000 to 3,000 centipoise viscosity when the polymer is at 10% to 20% concentration in an aqueous solution at 30°C;
    - it is non-hygroscopic; and
    - it is highly soluble in water, able to form hydrogel homogeneous dispersions at maximum concentration of 50% w/v..

2. A method for producing the enzymatic extract or preparation having both glucosyltransferase and fructosyltransferase activity, produced by Lactococcus lactis strain NRRLB-30656, consisting of:

a) Activating the Lactococcus lactis NRRLB-30656r microorganism, using a medium containing sucrose as carbon source, proteins as nitrogen source and mineral salts;

b) Fermenting the Lactococcus lactis NRRLB-30656 microorganism using a culture medium containing sucrose as carbon source, proteins as nitrogen source and mineral salts; and

c) Separating the enzymatic extract or preparation from the fermented medium using centrifugation or ultrafiltration.

3. The method for producing the enzymatic extract or preparation according to claim 2 where the microorganism activating step is carried out by inoculating a medium containing saccharose as carbon source, proteins as nitrogen source (yeast extract, ammonium sulphate, meat extract and other nitrogen sources) and mineral salts, incubated for 10-36 hours at 25°C, with stirring at 100-400 rpm and 5 to 9 pH.

4. The method according to claim 2, where the microorganism fermenting step is carried out by cultivating the Lactococcus lactis NRRLB-30656 microorganism using a culture medium containing sucrose as carbon source, proteins as nitrogen Source (yeast extract, ammonium sulphate, meat extract and other nitrogen

sources) and K2HPO4, FeSO4.7H2O, MgSO4.7H2O, MnSO4.H2O, CaC12.2H2O y NaCl mineral salts, which is incubated for 12-36 hours at 25°C, with stirring at 100-400 rpm, 1-2 vvm and pH 5 to 9.

5. The method according to claim 2, where the enzymatic extract or preparation, separating step is carried out by separating the enzymatic extract or preparation from the fermented medium by centrifuging the microorganism suspension between around 3 000 to 7 000 rpm.

6. The method for producing the enzymatic extract or preparation according to claim 2, where the fermentation step with the microorganism can be done by making preinoculum with the Lactococcus lactis NRRLB-30656 microorganism using a culture medium containing sucrose as carbon source, proteins as nitrogen source (yeast extract, ammonium sulphate, meat extract and other nitrogen sources) and K_2HPO_4, $FeSO_4$. $7H_2O$, $MgSO_4$. 7H2O, $MnSO_4$. H_2O, $CaCl_2$. $2H_2O$ and NaCl mineral salts, and is incubated for 12-36 hours at 25°C, with stirring at 100-400 rpm, 0.1-1 vvm and pH 5 to 9.

7. The method for producing an enzymatic extract or preparation having glucosyltransferase and fructosyltransferase activity according to anyone of claims 2-6, wherein the sucrose concentration content as carbon source is around (10-40 g/l concentration) and proteins concentration content as nitrogen source is around

7-30 g/l and the mineral salts content is around: 7-30 g/l K_2HPO_4, 0.01-1 g/l $FeSO_4$. $7H_2O$, 0.01-0.1 g/l $MgSO_4$. $7H_2O$, 0.001-0.1 g/l $MnSO_4$. H_2O, 0.001-0.01 g/l $CaCl_2$. $2H_2O$ and 0.01-0.1 g/l NaCl and is incubated around 10-36 hours at 25°C, with stirring at 100-400 rpm and pH 5 to 9.

8. A method for producing a glucose and fructose polymer, according to claim 1 comprising:

a) Incubating the enzymatic extract or preparation having glucosyltransferase and fructosyltransferase activity, obtained through fermentation according to anyone of claims 2 to 7, in a sucrose-containing medium as carbon source, with suitable stirring temperature, pH, enzymatic extract or preparation and substrate concentration substrate and reaction time conditions for producing the biopolymer.

b) Recovering and purifying the biopolymer by precipitation or ultrafiltration.

9. The method for producing the biopolymer, according to claim 8, where the enzymatic extract or preparation incubation step comprises:

Incubating the enzymatic extract or preparation in a sucrose-containing medium as carbon source, with suitable stirring (100-400 rpm), temperature, pH (5 to 9),

enzymatic extract or preparation (10-40% v/v) and substrate concentration (5-40%) and reaction time (12-48 hours) conditions for producing the biopolymer.

10. The method according to claim 8 where the step of recovering and purifying the biopolymer through precipitation comprises:

    - Adding 1.2-2.0 volumes of 96% ethanol to cold reaction mixture with stirring (the quantity of added ethanol corresponds to ethanol/reaction mixture volume);
    - Dissolving the precipitated biopolymer in half the volume of deionised and distilled water and precipitating it again with 1.2 to 2.0 volumes of ethanol/reaction mixture volume; and
    - Dissolving the precipitated biopolymer in a third of the volume of water and drying through lyophilisation or compressed air drying between around 50°C to 80°C until reaching around 5-6%humidity.

11. The method according to claim 8 where the step of recovering and purifying the biopolymer trough ultrafiltration comprises ultrafiltrating with the reaction mixture using a regenerated cellulose membrane having a pore size greater than 10,000 - 30,000 Dalton to eliminate residual glucose and fructose and submitting the biopolymer to aspersion drying.

12. A Lactococcus lactis strain microorganism isolated from Colombian soil, registered under accession number NRRL B-30656.

13. The microorganism according to claim 12 which produces the enzymatic extract or preparation having both glucosyltransferase and fructosyltransferase activity.

14. The microorganism according to claim 12 used to produce the biopolymer according to claim 1.

15. The microorganism according to claim 12 which is preserved in a sucrose containing medium with 20% glycerol at -70° C and lyophilised using 10% skimmed milk.

16. The biopolymer according to claim 1 which is used in the pharmaceutil industry as a viscous agent, thickener, stabiliser, dispersant, film forming age disintegrating agent, blood plasma substitute, lubricating agent and prebiotics' agent.

17. The biopolymer according to claim 1 which is used in the food industry as thickener, viscous agent, stabiliser, dispersant, fibre and ether- and ester-based fat, oil and carbohydrate substitute.

18. The biopolymer according to claim 1 which is used in products obtained by extrusion for forming films apt for producing flexible and biodegradable seals and obtaining disposable biodegradable products obtained by injection or moulding and for producing flocculent agents for water treatment.

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